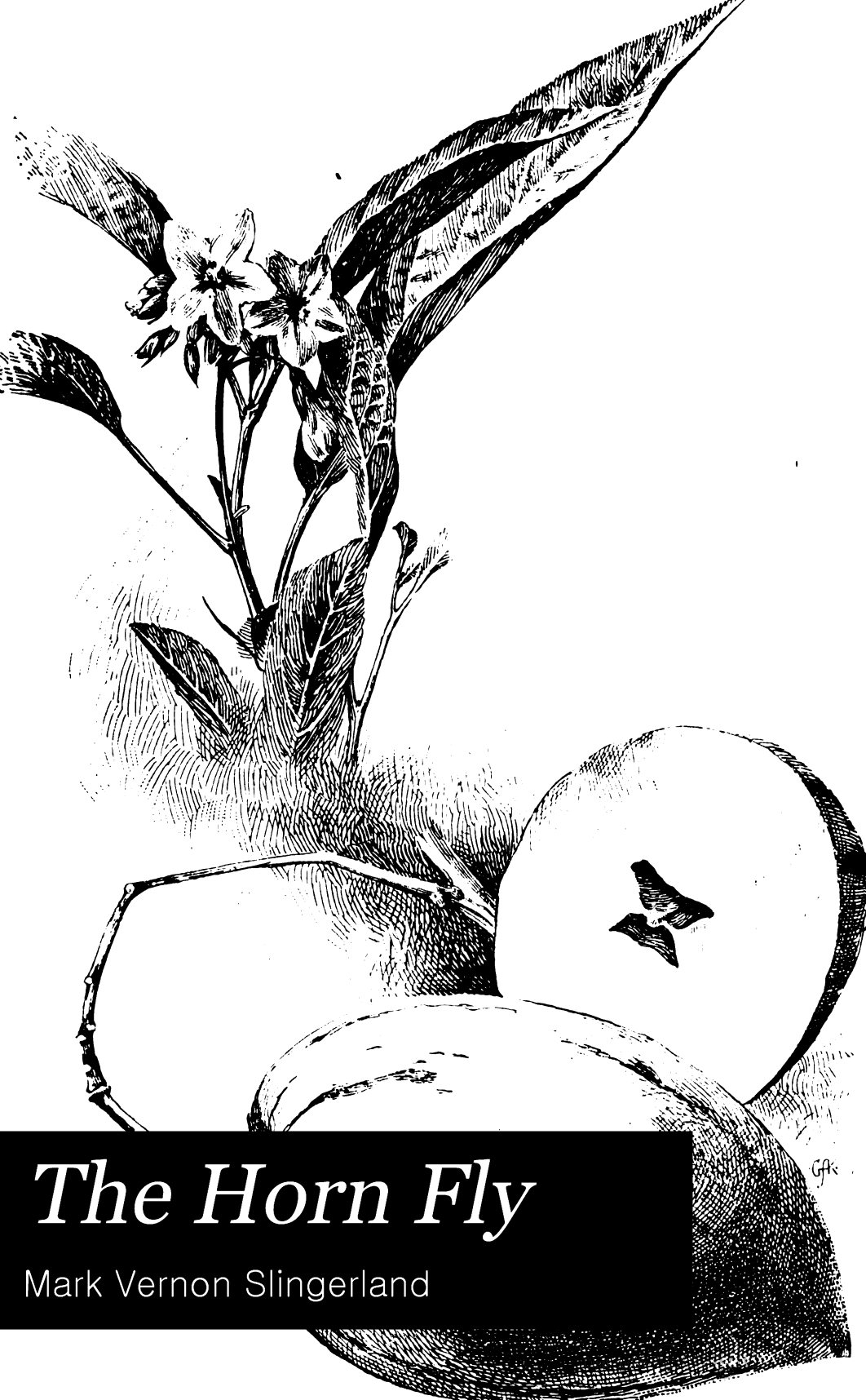

The Horn Fly

Mark Vernon Slingerland

CORNELL UNIVERSITY

Agricultural Experiment Station.

BULLETIN 37.

ALL DIVISIONS.

DECEMBER, 1891.

SUNDRY INVESTIGATIONS MADE DURING THE YEAR.

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CHEMICAL DIVISION.

DETERMINATION OF FATS IN FODDERS BY DIRECT WEIGHING OF THE ETHER-EXTRACT AND BY LOSS OF WEIGHT OF THE SUBSTANCE.

The present official method for the determination of fats in fodders requires that the substance should be dried in a current of dried hydrogen, at the temperature of boiling water, for four hours to remove all the moisture; the dried substance is then extracted with ether and the extract dried to constant weight under the same conditions.

In order to meet all these requirements Prof. Caldwell described in 1888 a "New Apparatus for Drying Substances in Hydrogen and for the Extraction of the Fat." A reference to the cut and the description[1] will show that these tubes serve the double purpose of glass stoppered weighing tubes, as well as drying tubes. This apparatus was made use of in the work described in this paper in the manner indicated in the bulletin, except that the current of hydrogen was conducted in the opposite direction. This change was found to be preferable, to prevent mechanical losses by particles of the substance being carried along with the current, and also to prevent the loosening of the asbestos filter from the metallic disk supporting it.

In the same bulletin Prof. Caldwell says:—"When the extraction is completed there seems to be no reason why the amount extracted cannot be determined by weighing the dried contents of the tube as well as by weighing the substance extracted: and the drying in hydrogen is much more easily managed in the former case than in the latter; but I have not yet had time to test this variation of the method."

[1] Bulletin No. 12 Cornell University Agr. Exp. Station.

At the seventh annual convention of the Association of Official Agricultural Chemists Mr. Anderson reported on two substances that the percentage of fat by loss of weight was a little larger than by weighing the extract. This he accounted for by saying that a portion of the fat was volatilized during the extraction.

In order to obtain some idea as to the favorable or unfavorable conditions for the loss of volatile fats during the extraction process, a short thermometer, 12½ c. m. long, was imbedded in the fodder tubes when ready for the extraction. The thermometer was of such length that it would be entirely inclosed in the extraction apparatus. Another thermometer was inserted in the flask. A number of temperature determinations were made in this way. The temperature of the substance in the extraction tubes ranged from 33° to 35° centigrade, the temperature of the contents of the flask registered 41°+43° C.

The substance before and after extraction, and the fat, were all dried at the temperature of boiling water and it would hardly seem possible that the lower and intermediate temperature of 43° would be the cause of a loss of a portion of the extract by volatilization. During the extraction the fat is in solution, and the conditions are less favorable for volatilization than in either the previous or subsequent drying at the temperature of boiling water.

A number of comparisons were made by the two methods. The tubes were dried first for the official four hours to remove the moisture, but the data obtained in this way were discordant; with some substances the agreement was close, but with others not so, there being a general tendency for higher results by the loss of weight. The work was repeated on the same substances in the following manner: instead of drying four hours, the drying was continued until duplicate weighings of the tubes agreed within one milligram. This required a variable length of time which always exceeded four hours, and in the case of gluten meal exceeded six hours. When the fats were determined by loss after drying in this way the agreement was much more satisfactory.

From the results thus obtained it appears that the first drying of four hours was not sufficient to remove all of the moisture, and the drying after the extraction removed the moisture left on the first drying; so that the loss of weight of the tubes also included

a variable amount of moisture with the ether-soluble matter. Hence the larger results by loss of weight.

In the following table the results on the same line are from the same weighed portion. The tubes were dried in hydrogen both before and after the extraction, except that tube c in samples Nos. 6, 7, and 8, and tube b of No. 11 were dried in air after the extraction.

ETHER-EXTRACT.

		By loss of weight of extraction tube.	Average.	By weighing of ether-extract.	Average.
No. 1, Brewers' grains	a	7.34		7.26	
	b	7.35	7.35	7.47	7.36
No. 2, Timothy hay	a	2.61		2.59	
	b	2.50	2.55	2.52	2.55
No. 3, Red clover hay	a	3.31		3.27	
	b	3.15	3.22	3.18	3.22
No. 4, Gluten meal	a	10.80		11.24	
	b	11.12		11.15	
	c	11.20	11.16	11.16	11.18
No. 5, Ensilage	a	2.22		2.19	
	b	2.28	2.25	2.32	2.25
No. 6, Cotton-seed meal	a	9.35		9.33	
	b	9.38		9.45	
	c	9.44	9.39	9.42	9.40
No. 7, Corn meal	a	4.04		3.92	
	b	3.92		4.04	
	c	3.85	3.93	3.85	3.93
No 8, Ship stuff	a	4.31		4.37	
	b	4.72		4.67	
	c	4.56	4.53	4.46	4.50
No. 9, Ensilage	a	2.41		2.45	
	b	2.12	2.27	2.28	2.36
No. 10, Ensilage	a	3.20		3.20	
	b	2.73	2.97	2.73	2.97
No. 11, Ensilage	a	2.06		2.57	
	b	2.50	2.55	2.66	2.61
No. 12, Ensilage	a	lost		2.41	
	b	2.43		2.57	

The total average by weighing the fat was .006 per cent. higher than by the loss of weight, a difference which is insignificant.

The tubes are more convenient for drying than flasks, and no additional or expensive drying apparatus is required as for the

flasks. The drying of the tubes after the extraction can be done much more quickly and efficiently than drying the flasks, for the gas passes through the substance rather than over its surface, thereby requiring less hydrogen. More than this, the results show that the use of hydrogen in this second drying can be dispensed with.

On the whole, therefore, it is more economical as to time, apparatus and hydrogen, to determine the fats by loss of weight of the substance, while there is no loss in accuracy.

THE DETERMINATION OF ALBUMINOID NITROGEN.

In the determination of nitrogen by the Kjeldahl method directions are given for the addition of potassium sulphide to precipitate all mercury from the solution in order to prevent the formation of mercuro-ammonium compounds which are not completely decomposed by soda solution.

The determination of albuminoid nitrogen according to the present official method, requires the use of 0.7 to 0.8 grm. of copper hydroxide previous to the determination of the nitrogen by the Kjeldahl method.

The copper hydroxide is carried along in the determination, and is freely soluble in the sulphuric acid; no provision is made for its removal, and when the potassium sulphide is "added to precipitate all mercury in solution," copper sulphide is alike precipitable in the acid solution, with the mercury. The copper present is more than enough to combine with all the potassium sulphide; the result is that neither metal is completely precipitated, a large and variable portion of the mercury is left in the solution, and all the conditions are favorable for the formation of mercuro-ammonium compounds. The work given to the potassium sulphide is doubled and the object for which it is added is not attained.

In order to determine to what extent the mercury so left in the solution would affect the results, a number of determinations were started; to some the official "20 c.c. of potassium sulphide" were added, and to others a sufficient quantity of the same solution to precipitate all the copper as well as all mercury in solution. The

large amount of precipitate formed in the latter case caused so much bumping that only one determination out of six could be completed.

In order to obviate this difficulty the operation was carried on exactly as required by the official method, except that previous to distillation the acid solution was made up to 200 c.c. and divided into two equal portions. One portion was distilled with the relative official amount of potassium sulphide, and the second with enough of the same solution to make the precipitation of both mercury and copper complete. This gives a more satisfactory basis for the comparison of results, since all the conditions previous to the distillation are the same as to the degree of oxidation and the amounts of mercury and copper in solution.

The following results were obtained:

		50 c.c. K_2S.		30 c.c. K_2S.		Difference.	
Ensilage No.	1	1.28	per cent.	1.12	per cent.	0.16	per cent.
		1.25	"	1.14	"	0.11	"
" "	2	.66	"	1.53	"	0.13	"
		.66	"	1.60	"	0.06	"
" "	3	1.36	"	1.27	"	0.09	"
		1.20	"	1.15	"	0.05	"
" "	4	1.52	"	1.45	"	0.07	"
		1.54	"	1.45	"	0.09	"
" "	5	1.18	"	1.08	"	0.10	"
		1.23	"	1.12	"	0.11	"
Average						.096	

The constant larger proportion of nitrogen yielded in these results with the 50 c.c. of potassium sulphide must be due to the incomplete precipitation of all the mercury in solution when only 20 c.c. is added. The average difference in the ten portions amounts to nearly a tenth of one per cent.

Blank determinations with both 20 and 50 c.c. portions of potassium sulphide gave no nitrogen. A difference of a tenth of one per cent. when multiplied by the protein factor would make a difference of over six-tenths per cent. of protein, which is too great to be overlooked.

Some change must therefore be made in combining Stutzer's and Kjeldahl's methods. The following proportions of substance and solutions have given me satisfactory results. Take 0.7 grm. of substance instead of 1 grm., a quantity of copper hydroxide and glycerine solution equivalent to .5 to .6 grms. of the hydrox-

ide instead of .7 to .8, and finally 30 c.c. of potassium sulphide instead of 20 c.c. Trials of these proportions on the committee sample of corn meal gave 1.56 per cent. and 1.55 per cent. of albuminoid nitrogen; with the old proportions, and all of the copper and mercury likewise precipitated, 1.56 per cent. of albuminoid nitrogen.[1]

In the determination of *nitrates* by the official method, 2 grms of zinc dust are used; but the previous addition of 2 grms. of salicylic acid converts the zinc into an insoluble form at the close of the digestion. This is shown to be true by the following results of the analysis of pure potassium nitrate, when the solution was divided as in the case of the determination of albuminoid nitrogen:

		20 c. c. K_2O.	40 c. c. K_2S.
1.	Nitrogen.....	14 02 per cent.	14.02 per cent.
2.	"	13.98 "	13.98 "

If in the above tests the salicylic acid is omitted the results obtained are not uniform, and fall short of the actual amount of nitrogen present. This is due to the presence of the zinc in solution, which causes the same trouble as the copper. Any other metal precipitable by potassium sulphide would be equally liable to produce the same effect, as all of the conditions would be equally favorable for the formation of mercuro-ammonium compounds.

DRYING SAMPLES OF FRESH MANURES.

In the analysis of farm manures, the most serious difficulty met with in the whole process, is the drying of the samples. If the sample is allowed to dry in the air, there is a possibility of a loss of nitrogen in the form of ammonia, and such drying is always accompanied by the formation of disagreeable volatile products. The sprinkling of the sample with a weak solution of oxalic acid has been proposed; this answers very well, but it is open to the objections of retarding the drying at first by increasing the percentage of water.

The drying can be carried on by artificial heat without loss of ammonia in the following simple manner:

[1] These changes as given above have been adopted in the official method.

The sampling bottle in which the manure is received is provided with a two-hole rubber stopper. Through one of these holes a glass tube with six or eight holes blown out through its walls is carried to the bottom of the bottle ; another tube passes first through the other hole of the stopper and is carried from this bottle through an upright condenser, and then nearly to the surface of a small quantity of standard acid in an Erlenmeyer flask. Hot air is aspirated through the bottle containing the manure and thence through the condenser and Erlenmeyer flask, where all escaping ammonia is caught, and can be determned by titration.

This method has been applied to the drying of samples of horse and hog manure, with satisfactory results.

THE DETERMINATION OF NITROGEN IN SOILS.

For the determination of the total nitrogen in soils, the modified Kjeldahl method has been proposed so as to include the nitrous and nitric nitrogen ; but this modification introduces many difficulties. In dealing with soil a large quantity of substance must be taken for the determination, and the addition of zinc dust and salicylic acid farther increases this bulk ; the zinc dust cannot be intimately mixed with the soil without much labor; and the amount of nitrogen in the form of nitrates and nitrites is too small to be determined in this manner.

In the case of fifteen samples of soil analyzed in this laboratory, only one yielded as much as 0.001 per cent. of nitrous and nitric nitrogen ; this is too small a quantity to be determined by titration and it is moreover much within the limits of error in the determination of total nitrogen, as the following results on some of the same samples of soil show :

Soil sample.	Nitrogen per cent.	Soil sample.	Nitrogen per cent.
No. 1.....	.070	No. 4.....	.0795
"	.066	"	.076
No. 2.....	.057	No. 5.....	.052
"	.053	"	.055
No. 3.....	.068	No. 7.....	.051
"	.063	"	.053

Furthermore, the nitrogen in the reagents used in the modified Kjeldahl method is usually greater in amount than that from the nitrites and nitrates in soil. Reagents can be prepared for the usual Kjeldahl method that yield no nitrogen in blanks, while the same is not true of the modified method.

In the modified Kjeldahl method the breakage and proportion of loss from bumping is greater than in the direct method.

In view of the fact that the nitrates and nitrites are separately determined by more delicate methods, and that nothing is gained by the modified Kjeldahl method, while many difficulties are introduced by its use, the direct method is much to be preferred, with a separate determination of the nitrite and nitrate.

MISCELLANEOUS ANALYSES.

Name of sample.	In the original substance.							
	Moisture.	Pure ash.	Ether-extr'ct.	Crude protein.	Crude fibre.	N-free extr'ct.	Total nitrogen.	Alb. nitrogen.
Gluten meal.....	8.50	1.03	11.20	19.35	5.20	54.72		
Brewers' grain.....	10.65	4.27	10.65	20.00	11.52	46.21	3.20	
Cotton-seed meal.....	7.66	7.46	9.40		44.74	28.57	7.16	6.71
Corn meal.....	12.07	1.07	3.98	9.74	2.54	70.57	1.56	1.56
Ship stuff.....	11.84	5.20	4.51	17.74	8.25	52.46	2.84	2.09
Anthers of corn.....	9.15	5.70	2.49	17.19	17.45	48.02	2.75	
Pollen of corn.....	10.25		1.16	21.12	5.71	59.13		

SAMPLING MILK.

A large amount of literature has appeared from time to time upon the subject of sampling of milk, a review of which would lead one to believe that no two samples drawn from the same can, would, upon analysis, show the same composition, even with the special sampling tubes and other mechanical devices that have been proposed. During the months of July and August an opportunity was offered for a study of this question in connection with the experiment upon the effect of a grain ration for cows at pasture. Individual samples of milk were taken from the night and morning milkings of a herd of sixteen cows. Also the milk of the whole herd was divided into two lots, each lot representing

the milk of a whole day, of eight cows, and then sampled. The results of the analyses are given in the following table; the numbers 13, 7, etc., are those of the samples of milk from the corresponding cows. The sample designated as "mixture" is a sample of the mixed milk of the eight cows in each lot.

JULY 24, 1891.

Lot I.				*Lot II.*			
Sample No.	13	4.90	per cent. fat	Sample No.	8	4.80	per cent. fat
" "	7	4.00	" " "	" "	1	4.50	" " "
" "	2	3.50	" " "	" "	12	5.00	" " "
" "	15	4.50	" " "	" "	3	3.80	" " "
" "	9	4.90	" " "	" "	10	4.40	" " "
" "	5	4.50	" " "	" "	16	5.50	" " "
" "	6	3.80	" " "	" "	11	5.20	" " "
" "	14	3.10	" " "	" "	4	4.60	" " "
Average		4.17	" " "	Average		4.50	" " "
Mixture		4.10	" " "	Mixture		4.50	" " "

AUG. 22.

Lot I.				*Lot II.*			
Sample No.	13	4.95	per cent. fat	Sample No.	8	5.25	per cent. fat
" "	7	3.75	" " "	" "	1	3.40	" " "
" "	2	3.70	" " "	" "	12	5.00	" " "
" "	15	4.80	" " "	" "	3	3.10	" " "
" "	9	5.60	" " "	" "	10	4.60	" " "
" "	5	4.65	" " "	" "	16	5.00	" " "
" "	6	4.85	" " "	" "	11	6.20	" " "
" "	14	4.80	" " "	" "	4	4.75	" " "
Average		4.31	" " "	Average		4.63	" " "
Mixture		4.20	" " "	Mixture		4.61	" " "

From these results it would appear that the percentages of fat for each individual cow must represent, with a fair degree of accuracy, the real amount of fat present: for any slight error in the sampling of the mixed milk of each lot, or of the night or morning's milk of any of the individual cows would have made itself apparent in the results. These samples were taken by simply mixing the milk with a long handled dipper and the results show that for the quantity of milk sampled (180 lbs.), no sampling tube or other mechanical device was necessary. All the samples were brought to the laboratory in numbered bottles, and the analyst had no other information in regard to them till after all the analyses had been made.

HARRY SNYDER.

BOTANICAL DIVISION.

SOME NOTEWORTHY WEEDS.

Within a comparatively recent period a number of weeds have made their appearance in the state of New York, especially in the central counties, which show a marked tendency to become troublesome, while others of an earlier introduction appear to be increasingly aggressive. Three weeds belonging to the one or the other of these classes are here noticed.

1. GOLDEN HAWKWEED. (*Hieracium aurantiacum*). This plant is a foot or more in height and readily recognized by its very showy flowers (or rather flower heads) of a deep orange or flame color, appearing in early summer. It is a perennial, and increases by runners as well as by seeds. It is not mentioned in any of the earlier editions of Gray's Manual, but in the latest (1890) edition is spoken of as occurring in fields and by roadsides from New England to New York. It seems to have been for some time established near Oswego where it has taken possession of whole fields. Within the last few years it has been reported from a number of different places in the central part of the state. The plant shows all the qualities of a persistent and aggressive weed, except that it does not increase with very great rapidity. Its habit is such that it ought to be promptly exterminated whenever it makes its appearance. It is of European origin, and was probably first introduced into the new world as an ornamental plant; its habits, however, render it quite too dangerous to use for this purpose. Fig. 1.

2. FIELD CHAMOMILE. (*Anthemis arvensis.*) This plant is also a native of Europe, and although not of recent introduction, being spoken of by Darlington as quite common about New York City more than forty years ago, is nevertheless recorded as rare in the last edition of the Manual. It appears, however, to be rapidly increasing in central New York, showing a very decided

FIG. 1.—*Golden Hawkweed* (*Hieracium aurantiacum*). *Drawn from nature by W. W. Rowlee.*

tendency to become abundant and troublesome. It resembles the mayweed very closely in appearance, but the flowers are larger, the foliage of a deeper green color, and the odor more pleasant and agreeable. It is generally considered an annual, but the seeds of the current season become well established plants before the advent of winter. It appears like a species which through varietal change has produced new forms possessing greatly increased weed-like characteristics.

3. BEARD-TONGUE. (*Pentstemon lævigatus*, var. *Digitalis.*) This plant is a native from Pennsylvania west-ward, but has found its way into central New York where it promises to become a more or less troublesome weed. According to Mr. Rowlee it has taken possession of a field in the eastern part of Tompkins County, and seems to be increasing and spreading with a considerable degree of rapidity. The plant is four to five feet high, showy in appearance, with numerous white, tubular flowers, an inch or more in length, borne in loose clusters at the top of the stem. An effort should be made to prevent this plant from securing a foot hold in other localities. It belongs to a family which furnishes a number of well known weeds among which the common mullein, the moth mullein, butter and eggs, and the speedwells, those pests of the lawn, may be mentioned. Fig. 2.

VARIATION IN ROOT PRESSURE IN DIFFERENT SPECIES.

By root pressure is meant the power of the roots of certain plants of forcing water, taken up by absorption from the soil, upwards into the stem. A familiar illustration of this power is seen in the grapevine when cut off in the spring, the roots forcing water upwards into the stem, causing it to run over, or bleed, at the cut surface. Root pressure, as here defined, appears to be wholly wanting in certain species, and in the same species occurs at different periods.

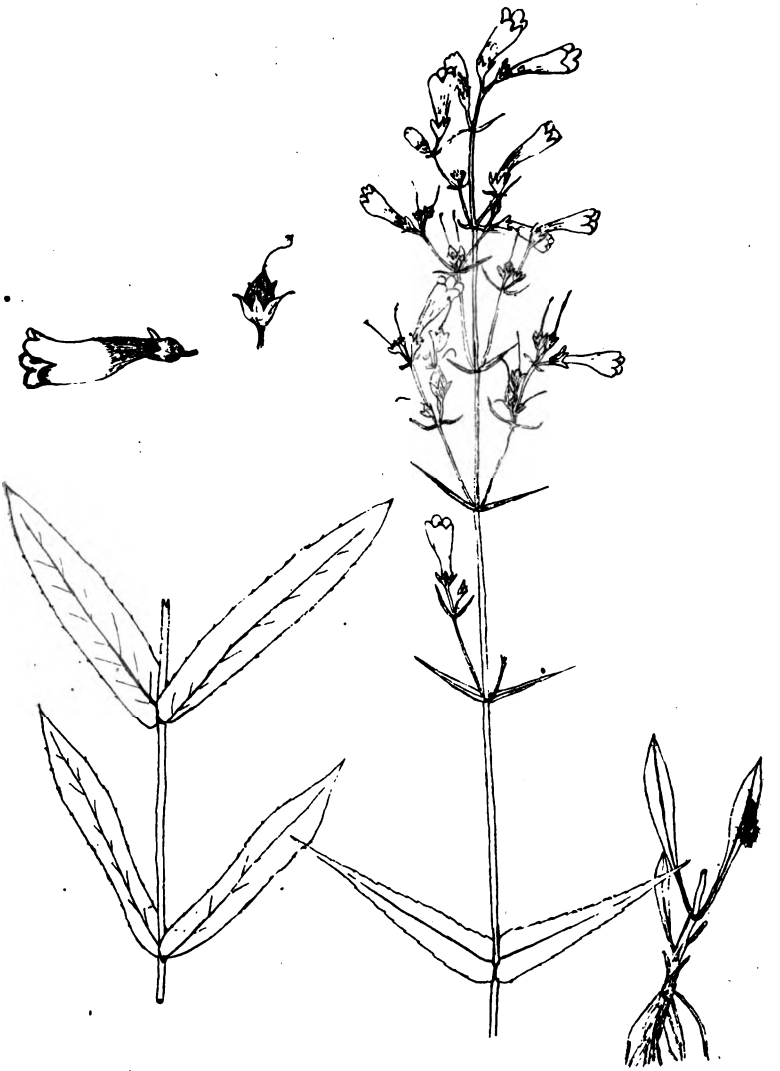

FIG. 2.—*Beard-tongue* (*Pentstemon lævigatus var. digitalis*). *Drawn from nature by W. W. Rowlee.*

The observations as here recorded are intended to show the variation in the force of root pressure in different species of green house plants grown in pots and subjected to the same conditions of heat, light and moisture. The plants were prepared for the experiment by cutting off the stems three inches above the ground and attaching a glass tube to the stump by means of a piece of rubber tubing, which was strongly wired at both ends as shown in the figure. The height to which the water rose in the glass tube was supposed to show the relative force of root pressure in the several species. The plants were all strong and healthy and apparently in a vigorous condition of growth.

FIG. 3.—*Plant prepared to show root pressure.*

In the following table the results of the experient are shown, fractions being omitted.

TABLE I.

Kinds of plants.	Total rise of water in the tube in inches.	Average rise of water per 24 hours in inches
Balsam a.	97	11
" b.	49	5
" c.	61	5
Begonia a.	65	3
" b.	57	2
Eucalyptus	1.5	
Coleus.	15	1
Geranium.	1.5	

The length of time in days during which the water continued to rise in the several tubes may be determined approximately by dividing the figures of the second column by those of the third.

In the following table the variation in root pressure is reduced to equivalent values, the lowest being taken as the unit. Fractions are omitted.

TABLE II.

Kind of plant.	Units of root pressure.
Balsam a	65
" b	33
" c	40
Begonia a	43
" b.	38
Eucalyptus	1
Coleus	10
Geranium	1

Summary.—The results show a marked variation in the force of root pressure in different species, and a considerable variation in different individuals of the same species.

A. N. PRENTISS.

AGRICULTURAL DIVISION.

DEHORNING.

We have received so many inquiries in regard to this practice that it has seemed worth while that we should give a brief outline of our experience, in this bulletin. We have made it a practice, for the past six or seven years, to dehorn our cows as soon as they come into the dairy, and at the present time there is no animal having horns on the farm. While for the most part, the horns have been removed by students and others who have never even seen the operation performed, we have, as yet, to meet the first case where there has been any ill effect following the operation. The last time the operation was performed, was on Nov. 5, 1891, at which time, among others, five cows in milk were dehorned. Three of these were heifers under two years old, two were mature cows that had been purchased in the neighborhood; all were comparatively fresh in milk. One, the first one in the table, had only been milked six days. In table I below, is shown the daily milk yield of the five dehorned cows on the day of the operation and for the five days preceding and following. In table II is shown the daily milk yield of seven cows, not dehorned, for the same days. These cows had been in milk approximately the same length of time as those dehorned.

TABLE I—DAILY MILK YIELD—FIVE DEHORNED COWS.

	Days before dehorning.					Nov 5, 1891, Dehorned. lbs.	Days after dehorning.				
	5th. lbs.	4th. lbs.	3rd. lbs.	2nd. lbs.	1st. lbs.		1st. lbs.	2nd. lbs.	3rd. lbs.	4th. lbs.	5th. lbs.
Carrie				7.25	8.50	**8.75**	8	9	8.25	8.75	8.50
Daisy.....	8.50	7 50	8.50	7·75	7·50	**8.25**	7·75	7·50	7·75	7·50	7 50
Ida	14.50	12.50	12	9.25	13	**13**	12.25	13	13	12.75	13.25
Pandora	27.25	26.50	24	26.75	27.50	**24.50**	18.50	25 75	25 75	25	23.75
Roxy.....	26.50	27 50	27.50	27.50	27	**25.25**	25.25	28	27.25	27.75	27.75

TABLE II—DAILY MILK YIELD—SEVEN COWS NOT DEHORNED.

	5th. lbs.	4th. lbs.	3rd. lbs.	2nd. lbs.	1st. lbs.	Nov. 5, 1891.	1st. lbs.	2nd. lbs.	3rd. lbs.	4th. lbs.	5th. lbs.
Belva.....	40.75	38.25	42.50	37.50	40.75	**34**	36.50	41.50	39 25	38	37.50
Bertha	17.25	16	16.75	15.75	16	**17**	15.50	16	16	16 75	15.75
Freddie	42	42	45	41.50	44.50	**43**	43.25	43	43	40.50	40.25
Glista.....	20.75	20.25	21	23.25	22.25	**21.50**	23.75	22.25	22.50	22.25	20.75
Pearl.....	27.75	28	25.75	24	27.75	**29.25**	27	28	29.25	26.75	28.25
Ruby.....	19	19.75	20.25	21	22.75	**24**	22.50	24	22.50	23	22 75
Shadow.....	36.50	33.50	33	34.50	24 50	**29**	29	30.25	31	31.75	30

A glance at tables I and II shows that the cows dehorned were very little affected by the operation, with the exception of the cow, Pandora. It will be seen that she fell off three pounds upon the day on which she was dehorned and six pounds more on the following day, after which she nearly regained her normal flow. The variations in the case of the other cows were extremely trivial, and it will be seen by referring to table II that some of the cows not dehorned varied quite as much, and that, too, on the same days; for instance, Belva fell off six and three-quarters pounds on the same day on which the others were dehorned, and Shadow fell off ten pounds on the day preceding. In the following table we have shown the losses immediately following the operation with each individual, and also the extreme variation in the whole period of five days before and five days following, and for purposes of comparison, have included the variations on these days for the cows that were not dehorned.

TABLE III.

	Av. daily yield for 5 days preceding. Lbs.	Gain + or loss — on day of operation. Lbs.	Gain + or loss — on day following operation. Lbs.	Total gain or loss in 2 days. Lbs.	Variation between largest and smallest y'ld in 11 days. Lbs.
Cows dehorned:					
Carrie	8.00	+ .75	— .75	+ .00	1.75
Daisy	8.00	+ .25	— .50	— .25	1.00
Ida	12.25	+ .75	— .75	+ .00	5.25
Pandora	26 50	—2.00	—6.00	—8 00	9.00
Roxy	27.25	—2.00	+ .00	—2 00	2.75
Average		— .45	—1.60	—2.05	3 95
Cows not dehorned:					
Belva	40.00	—6.00	+2.50	—3.50	8 50
Bertha	16.25	+ .75	—1.50	— .75	1.75
Freddie	43.00	+ .00	+ .25	+ .25	4.25
Glista	21 50	+ .00	+2.25	+2.25	3.50
Pearl	26 75	+2 50	—2.25	+ .25	5.25
Ruby	20.50	+3.50	—1 50	+2 00	5 00
Shadow	32.50	—3.50	+ .00	—3 50	12.00
Average		— .39	— .04	— .43	5 75

It will be seen that in the case of the dehorned cows, there was an average loss of a little more than two pounds per cow for the day of the operation and the day following, as compared with the average yield for the five days preceding. On the other hand, it will be seen that the seven cows that were not dehorned gave on these two days an average of forty-three hundreths of a pound of milk less than the average for the five days preceding; so that not all of the two pounds could well be attributed to the operation of dehorning. When we come to consider the extreme variation in the yield, as shown in the last column of table III, it will be seen that the average variation of the five dehorned cows was a little less than four pounds in the whole period of eleven days, while the average variation of the seven cows, not dehorned, in the same period was nearly six pounds. This was undoubtedly due to the fact that the average milk yield of the seven cows not dehorned was considerably greater than of the five dehorned cows; but it shows that the operation of dehorning did not cause at least any greater daily variation.

So much for the immediate effects of dehorning, now as to the time required for recuperation. We have shown in table IV the gain or loss in the milk yield for the five days following the operation as compared with the five days preceding, and here we find that there was an average daily loss of a little less than one-half a pound for the five cows dehorned, but in the same time the seven cows that were not dehorned, gave seven hundreths of a pound per day less in the last five days. It would seem then, studying the milk yield in all its relations, that the loss in milk yield, when cows in milk are dehorned, is insignificant.

TABLE IV.

Cows dehorned.	Average milk yield for 5 days before operation. Lbs.	Average milk yield for 5 days following operation. Lbs.	Gain + or loss — per day. Lbs.
Carrie	8.00	8.50	+ .50
Daisy	8.00	7.50	— .50
Ida	12.25	12.75	+ .50
Pandora	26.50	23.75	—2.75
Roxy	27.25	27.25	+ .00
Average			— .45
Cows not dehorned.			
Belva	40.00	38.50	—1.50
Bertha	16 25	16.00	— .25
Freddie	43 00	42.00	—1.00
Glista	21.50	22.25	+ .75
Pearl	26.75	27.75	+1.00
Ruby	20.50	23.00	+2.50
Shadow	32.50	30.50	—2.00
Average			— .07

The only requisites for successfully performing the operation are that the animal's head should be securely fastened and the operator possessed of courage, and a sharp saw. We have ordinarily used what is known by carpenters as a "cut off" saw; that is, a small, flexible saw, with rather fine teeth; others have preferred to use a stiff back saw. The horns should be removed from the head so as to take with them just a few hairs, all the way around. It is usually of advantage to clip off some of the hairs about the base of the horn, with a pair of shears, and before beginning, the operator should examine the horn and get his bearings, so that when once the operation is begun no stop need be made until the horn comes off; ordinarily but very little blood is lost in the operation; some animals, however, will bleed considerably and very rarely it is necessary to bind a rag smeared with

pine tar over the stump to stop the bleeding. Animals under three years old that are in good flesh and thrifty growing condition are more apt to bleed freely. It is not necessary that any application be made to the stump, but we have thought it of advantage to apply a little carbolated vaseline; this is chiefly of benefit in warm weather in keeping away flies. Usually the wound heals up without suppurating but in about one case in ten, some pus will form. We have found it of advantage in such cases to bind on a rag smeared with pine tar as before described.

Since the operation referred to above was performed Mr. S. Alfred Seely, of Spencer, N. Y., sent us for trial a pair of patent dehorning clippers, invented by Dr. H. W. Leavitt, of Hammond, Piatt Co., Ill. We have used these upon the cattle of our neighbors sufficiently to show us that they are far superior to any method we have yet seen devised. They act upon the principle of the pruning shears and remove the horns more easily than the saw and with apparently considerably less pain to the animal.

A NEW MATERIAL FOR PRESERVING EGGS.

In the summer of 1890 we received from Messrs. A. E. Richter & Co., of Fond du Lac, Wis., through Messrs. Munn & Co., of New York, a package of material with a request that it should be tested as a material in which to pack eggs for preservation till winter.

The material was a brick red mineral, extremely finely ground, and a chemical analysis showed that it was principally composed of silicates of iron, lime and aluminum, the reddish color being due to the iron.

Sept. 9th, there was purchased from a dealer in the city, some eggs, guaranteed by the expert in the employ of the firm to be fresh. Part of these eggs were packed in a barrel with the Richter mineral, part in a nail keg in fine salt, and still another part in a stone crock in a solution of lime water and brine. All were placed in a dry, cool room where the temperature varied from fifty-five to sixty-five degrees.

Jan. 21, 1891, the eggs were unpacked; there were taken out the following numbers:

From the Richter mineral.....15 dozen and 11.
From the salt .....9 dozen and 9.
From the solution of lime water and brine, 3 dozen and 6.

They were examined carefully with a candle by the same expert from whom the eggs were purchased and the following numbers were thrown out as absolutely bad from each lot :

From the Richter mineral..... ..... 9 eggs or 4.7 per cent.
" " salt.....5 " " 4.3 "
" " solution of lime water and brine 2 " " 4.8 "

It will be seen that no better results were obtained from the use of this mineral than from the use of salt. or lime water and brine. To further test the matter, some eggs known to be not more than two days old were purchased, and with the eggs preserved in the different ways, and all marked simply with numbers, were sent to eight different ladies in the neighborhood, with the request that a cooking test be made of each of the lots, and their opinion given as to their comparative value. All, without exception, pronounced the preserved eggs much inferior to the fresh, and most of the ladies reported that, of the preserved eggs, those kept in salt were somewhat better than those preserved in the Richter mineral.

It would seem that this new material for preserving eggs, offers no advantage over the use of fine salt.

I. P. ROBERTS.

ENTOMOLOGICAL DIVISION.

THE HORN FLY.

Hæmatobia serrata.

Order DIPTERA; family MUSCIDAE.

A small black fly, one half the size of the common house fly, attacking cattle in the field, and oftentimes resting in large numbers around the base of the horns.

This recently imported European cattle pest first made its appearence in considerable numbers in this country near Philadelphia during the summer of 1887. Since that time it has spread quite rapidly in all directions and now the farmers of at least nine states (Pennsylvania, Delaware, New Jersey. Maryland, Virginia, West Virginia, New York, Kentucky and Ohio) recognize it as a troublesome pest among their cattle. During the past summer the flies have appeared in the southern, the central, and the extreme western portions of our State; and inquiries regarding the new pest have been so numerous that it seems advisable to here briefly discuss what is known of its habits, its life history, and the remedies which have been recommended.

The insect has been investigated by Dr. Riley and Mr. Howard of the Department of Agriculture at Washington, and by Prof. J. B. Smith of the New Jersey Experiment Station; our information is condensed from their published reports.*

The insect appears to be a native of southern Europe, where it has not however been reported as a serious pest. It was probably brought to this country with imported European cattle about 1886. The fly, which has been known in Europe since 1830, is of a dark greyish-black color and belongs to the same order of insects as our common house fly, which it resembles in general

* Riley and Howard: Annual Rept. of U. S. Entomologist, 1889, p. 345–348; l.c. 1890. p. 246-249; Insect Life, Vol. 2, p. 93-104; l.c. Vol. 3, p. 42.
Smith: Bulletin No. 62, New Jersey Experiment Station, Nov. 1889, 40 pages.

appearance. It is about one sixth of an inch in length and its whole body is quite densely clothed with stiff blackish hairs. The head is almost entirely taken up by the eyes, which are of a dark reddish-brown color. The proboscis, the instrument with which the biting is done, is conspicuous and when the fly is at rest it projects straight forward from the head ; on each side of the proboscis is an unusually long palpus densely clothed with short stiff hairs. The abdomen is rather small, almost as broad as long and flattened above.

In localities where the pest has become established, the flies first appear in May. They increase in numbers very fast until in June and July they appear in swarms and torment the cattle to such an extent that in many cases the animals lose condition and the yield of milk is lessened from one-third to one half. As fall approaches the flies become less and less numerous and finally disappear with the first cold and frosty weather.

The flies instinctively seek those portions of the body which are not easily reached by the head or the tail of the animal, as the back, the flanks, beneath the belly, and on the udder. A fly alights on the animal, quickly works its way, with wings still expanded and ready for instant flight, among the hairs, and soon the proboscis has punctured the skin and the blood of the animal is being pumped into the body of the fly. During the early part of the summer especially, the flies congregate in large numbers about the base of the horns. This peculiar habit suggested the popular name, the Horn Fly. The flies do not feed upon the horn or the skin about its base as many suppose, but they simply rest there with the wings folded over the back. In some cases large sores are found on the body of an animal in its efforts to rid itself of the flies by continued rubbing against objects and by licking the spot where bitten. The flies usually confine their attacks to the cattle in the field but sometimes they follow the animals indoors and torment them in the stables.

The early stages of the Horn Fly are not passed on the cattle as some suppose, but in and beneath the piles of freshly dropped dung in the field. The eggs, which are only .05 of an inch in in length and .015 of an inch in diameter are of a reddish brown color and are laid during the daytime on the surface of dung which has just been dropped. In shape the

eggs are elongate oval slightly curved with one side flattened. Within twenty-four hours a narrow spoon-shaped strip splits off from the flattened side of the egg, and a white footless grub emerges and descends for a short distance into the dung upon which it feeds. The grub or larva grows rapidly and in about five days it is full grown and measures .35 of an inch in length. It is of a dirty white color, nearly smooth, and tapers considerably toward the head which is cleft at the tip. When full grown the larva descends for a short distance into the ground below the dung. It there shrinks nearly one half in length, the skin hardens, becomes reddish-brown in color, and a short elliptical puparium results. While in this state which lasts about six days, the insect remains inactive. A fully developed fly emerges from the puparium and soon joins its comrades on the bodies of the cattle. Thus the whole life cycle of the pest from the laying of the egg to the appearance of the fly occupies a period of only about two weeks. This rapid multiplication of the species accounts for its appearance in such swarms and renders it possible for seven or eight generations of the flies to appear during the year. The winter is probably passed in the pupa state in the ground beneath the dung.

Remedies:—Two classes of remedies are practicable; preventive, to prevent injury to the cattle by keeping off the fly; and destructive, by destroying the insect in its larval or adult condition. The fly may be kept away from the cattle for several days by the application of almost any greasy substance to the parts more liable to attack. Fish oil, to which a little carbolic acid has been added as a healing agent, is the most highly recommended; common axle-grease, tallow, kerosene emulsion, or sheep-dip may be used to good advantage. The substance may be applied with a sponge or as a spray. One thorough application is often sufficient, but as its repelling power usually lasts only five or six days, it may be necessary to repeat the application.

Among the destructive agents for the fly, tobacco powder is considered the best. It should be dusted on those parts where the flies most usually congregate, and it is certain death to those that come in contact with it. The larvae may be destroyed by scattering a little lime or plaster on the fresher droppings in

the field. This should be done in the early part of the season as every larva killed then represents the death of many flies later. In many cases this is a very practical remedy for the lime or plaster is cheap and in almost every field there are some spots where the cattle preferably congregate during the heat of the day and the droppings will be more or less together and easy to treat.

MARK VERNON SLINGERLAND.

HORTICULTURAL DIVISION.

PHYSALIS,* OR HUSK TOMATO.

Under the name of Husk Tomato, Strawberry Tomato, Winter Cherry, and Ground Cherry, species of physalis have come into prominent notice during the last few years. The genus physalis is somewhat allied to the tomatoes and red peppers, and like most other groups of the family it is puzzling to botanists. There are a number of native species of physalis, one or two of which are well known in some parts of the country as ground cherry, and the fruits of which are esteemed for preserves. In fact, one of these native plants (*Physalis pubescens*) is the same species as the commonest husk tomato of the gardens, although the cultivated form probably came first from some tropical or sub-tropical country. This species is very widely distributed. There has been no recent attempt to distinguish the species and varieties of our cultivated physalises, and knowledge of them is greatly confused. We have grown seven species,† only three of which need be discussed here, as they are the only ones which appear to have been introduced into cultivation as fruit-bearing plants. These three are as follows:

1. PHYSALIS PUBESCENS. Fig. 4. This is the common Strawberry Tomato of seedsmen (the Erdbeer tomato of the Germans), the Dwarf Cape Gooseberry, Golden Husk Tomato, and the Improved Ground Cherry (of Childs). It is a low plant, trailing flatly upon the ground, or sometimes ascending to the height of a foot. The leaves are rather thin and nearly smooth, more or less regularly and prominently notched with blunt teeth. Flowers small (⅜ in. or less long), bell-shaped, the limb or border erect and whitish-yellow, the throat marked with five large brown

*Pronounced *Fiss'-a-lis.*

†*Physalis pubescens*, Linn. *P. Peruviana*, Linn. *P. capsicifolia*, Dunal. *P. Alkekengi*, Linn. *P. viscosa*, Linn., from Paraguay (collected by Dr. Thomas Morong). *P. angulata*, Linn., and *P. obscura*, Michx., from our southern states.

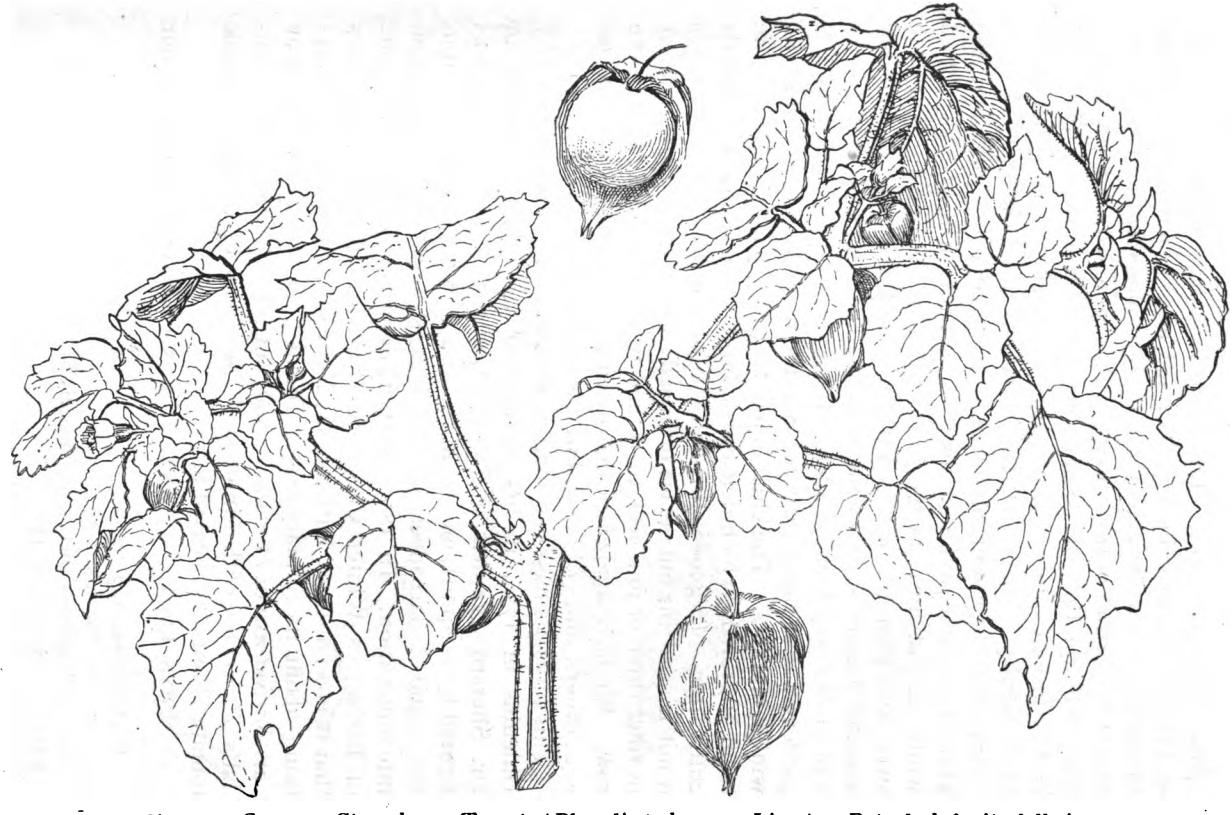

FIG. 4.—*Common Strawberry Tomato* (*Physalis pubescens, Linn.*). *Detached fruits full size.*

spots; anthers yellow. The husk is smooth or nearly so, thin and paper-like, prominently 5-angled and somewhat larger than the small, yellow, sweetish and not glutinous fruit. Fig. 4 is an excellent portrait of this species. The detached fruits are natural size, although the fruit is sometimes larger than these. The plant is very prolific, and the fruits are considerably earlier than in the other species. When ripe, the fruits fall, and if the season is ordinarily dry they will often keep in good condition upon the ground for three or four weeks. The fruits will keep nearly all winter if put away in the husks in a dry chamber. They are sweet and pleasant, with a little acid, and they are considerably used for preserves, and sometimes for sauce. The plant is worthy a place in every home garden. It is grown more or less by small gardeners near the large cities, and the fruits are often seen in the winter markets. The chief objection to the plant is its prostrate habit of growth, which demands a large amount of ground for its cultivation. In good soil it will spread four feet in all directions if not headed in, but as we ordinarily grow it, the plants are set in rows three or four feet apart and two or three feet apart in the row. We have made repeated attempts to hybridize this species with others, and *vice versa*, but always without success.

This physalis has been long in cultivation. It was figured by Dillenius in 1774, in his account of the plants growing in Dr. Sherard's garden at Eltham, England*. In 1781–6 it was figured by Jacquin†, and by him called *Physalis Barbadensis*, from the island of Barbadoes, whence it was supposed to have come into cultivation. In 1807, Martyn‡ described it under the name of Barbadoes Winter Cherry or *Physalis Barbadensis*, and says that it is a native of Barbadoes. None of these authors say anything about its culinary uses. Dunal ||, in 1852, described it as var. *Barbadensis* of *Physalis hirsuta*, but later botanists § unite Dunal's *P. hirsuta* with Linnæus' *P. pubescens*, of which this husk tomato is but a cultivated form.

2. PHYSALIS PERUVIANA. Fig. 5. I have grown this under

* Hort. Eltham. t. 9, fig. 9.

† Icones Pl. Rar. i. 5, t. 39.

‡ Martyn's Miller's Dict. 1807, Physalis No. 14.

‖ D. C. Prodr. xiii (i). 446.

§ See A. Gray, Syn. Fl. ii. part 1. 234.

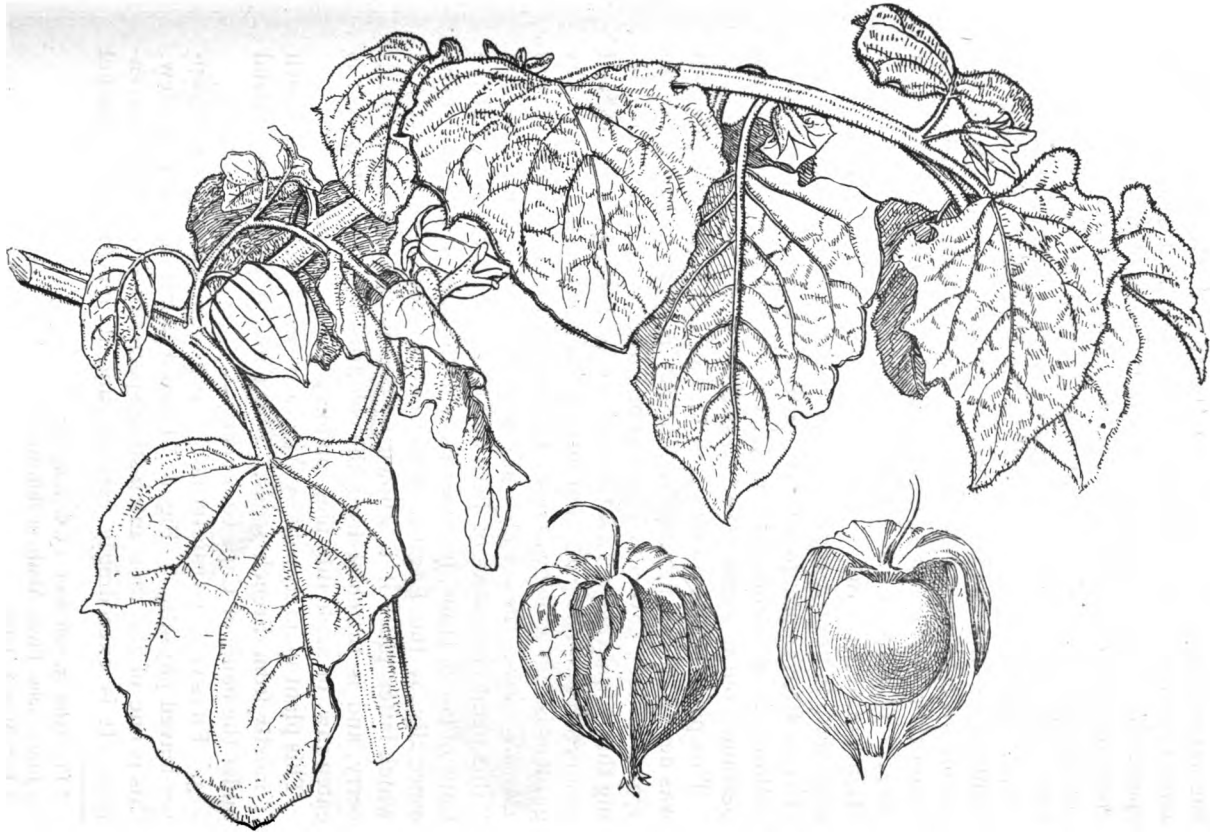

FIG. 5.—*Peruvian Husk Tomato* (*Physalis Peruviana*, *Linn.*). *Fruits natural size.*

the names Cape Gooseberry (not Dwarf Cape Gooseberry), *Physalis Peruviana*, and *P. pubescens*. As compared with the above species, it is a much stronger grower, the plant standing partially erect and attaining a height of one and a half to three feet; leaves thicker, less regularly toothed, more pointed, heart-shaped at the base, and very pubescent or fuzzy; flowers larger (½ or ⅝ in. long), open-bell-shaped, the limb or border widely spreading and light yellow, the interior or throat blotched and veined with five purple spots, the anthers blue-purple. The husk is thicker and larger than in the last, somewhat hairy, and has a much longer point. This species is too late for our climate. At Lansing, Michigan, during two or three years, the flowers did not appear until the middle of August, and very few ripe fruits were obtained Here at Ithaca perhaps a fourth of the crop ripens. The berry is yellow, not glutinous, and much like that of *P. pubescens* in appearance, but it seems to be less sweet than that species.

This plant has been cultivated for two centuries, probably. It was described and figured by Morison in 1715* in England. In 1725 Feuillée† gave a description of its cultivation in Peru, saying that it was then cultivated with care and was greatly esteemed as a preserve. The particular form of the species cultivated in our gardens is that which was described and figured by Sims in 1807 as *Physalis edulis*, the "edible physalis."‡ Sims' account says that "this plant is a native of Peru and Chili, but is cultivated at the Cape of Good Hope, in some parts of the East Indies, and more especially at the English settlement of New South Wales, at which latter place it is known by the name of the Cape Gooseberry, and is the chief fruit the colonists at present possess; is eaten raw, or made into pies, puddings, or preserves."

This plant is rarely sold by American seedsmen. I have grown it mostly from French seeds. I once had it from New Zealand under the name of Cape Gooseberry.

3. PHYSALIS CAPSICIFOLIA, "capsicum leaved" or "pepper-leaved physalis." Fig. 6. From a botanical point of view, this is one of the most interesting species of physalis in cultivation. It is exceedingly variable, and it appears as if distinct

* Pl. Oxon. 3, 526, sect. 13, t. 3, fig. 17.

† Journ. Obs. Phys. Math. et Bot. iii. 5, t. 1.

‡ Bot. Mag. t. 1068.

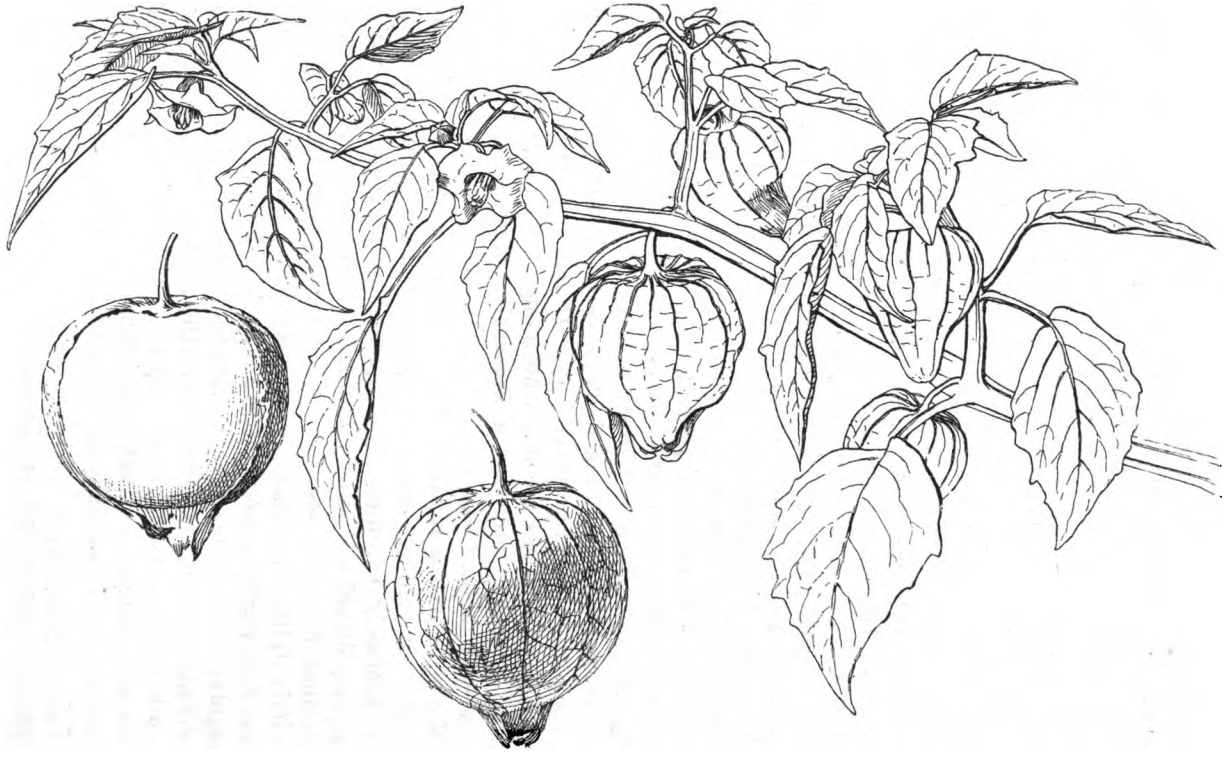

FIG. 6.—*Pepper-leaved Physalis* (*Physalis capsicifolia, Dunal*). *Fruits full size.*

varieties can be readily bred from it. We have grown it under two or three names. It is usually called, though erroneously, *Physalis edulis*. This name is misleading, for the fruit is really scarcely edible because of its very pronounced mawkish flavor. The fruit is far the largest and handsomest of any physalis which I have grown, and it is not improbable that we may be able to obtain a desirable variety from it. The plant is exceedingly productive, and adapts itself to almost any soil or condition. It grows erect to a height of three or four feet, bearing smooth branches and leaves. The leaves are thin, ovate or lance-ovate and variously toothed or notched. The flowers are large and open (¾ in. or more across), the border bright yellow and the throat bearing five black-brown spots; anthers purplish. The husk is entirely filled by the large round sticky berry, and is sometimes torn open by it.

This plant is supposed to be native to South America or the West Indies. It was early grown in gardens, perhaps because of its supposed medicinal properties. Dr. Sherard obtained it in Holland in the last century and grew it in his garden at Eltham, England, and Dillenius figured it in 1774.* Martyn† described it in 1807, but says nothing about its uses. An interesting feature of the plant is its great variability. Dillenius figured the leaves as nearly entire, and Dunal,‡ who named the plant, so describes them; but the greater part of the cultivated specimens have conspicuously toothed leaves.

We have tried a number of interesting experiments with this species. A year ago one plant appeared in our plantation which bore profusely of unusually large and purple fruits, and which was very dwarf and stocky in habit. The plant was so attractive that we saved seeds of it. All the plants this year were entirely unlike the parent, being very tall growers and bearing an ordinary crop of medium green-husked fruits. But the most singular circumstance was the fact that while the plants were all unlike the parent, they were nevertheless very like each other! In other words, there was almost no variation in the offspring. Now, alongside these plants were sown unselected seeds, and from them we secured scarcely two plants alike. The first plant in the

* Hort, Eltham. t. 11.

† Martyn's Miller's Dict. Physalis no. 11.

‡ D. C. Prodr. xiii (i). 449.

row, for instance, was low and straggling (only 16 in. high), the branches lying almost horizontal; the leaves were small and the branches green. The second plant in the row was erect (growing 3 ft. high), with large leaves and purple branches. The first nine plants represented nine very different types, the differences being, in some cases, even greater than those which ordinarily distinguish well marked varieties of cultivated plants. Numerous attempts have been made to cross-pollinate this species, but without success.

In conclusion, we may say that three species of physalis or husk tomato are cultivated for fruit. One of these, variously known as the Strawberry Tomato, Golden Husk Tomato, Dwarf Cape Gooseberry and Improved Ground Cherry, is well worth growing in the home garden. The true Cape Gooseberry is too late for this latitude. The pepper-leaved physalis, erroneously known as *Physalis edulis*, is unfit for general cultivation for fruit, although it is an interesting plant to the experimenter.

PEPINO.—*Solanum muricatum.*

Within the last few years a novelty has appeared in the seedsmen's catalogue under the name of Pepino, Melon Pear, Melon Shrub, and *Solanum Guatemalense.* Its botanical affinities, as well as its horticultural merits, have been a perplexity. We have now grown the plant for two seasons, in the house and out of doors, and it has proved so interesting and unique that I have prepared this account of it.

The plant is a strong growing herb or half shrub in this climate, becoming two or three feet high and as many broad. It has a clean and attractive foliage, comprised of long-lanceolate nearly smooth very dark green entire leaves. It is a profuse bloomer, the bright blue flowers reminding one of potato flowers. But one fruit sets in each flower cluster, and as this grows the stem elongates until it reaches a length of from four to six inches. The fruit itself is very handsome. As it ripens it assumes a warm yellow color which is overlaid with streaks and veins of violet-purple. These fruits are somewhat egg-shaped, conspicuously pointed, and vary from two and a half to three and a half inches in length. The illustration, Fig. 7, shows the natural size of an average specimen. If the fruits are still green upon the approach

of frost, they may be placed in a cool dry room where, in the course of two or three weeks, they will take on their handsome color. If carefully handled or wrapped in paper, the fruits will keep until mid-winter or later. The fruit is pleasantly scented, and the flavor of it may be compared to that of a juicy, tender and somewhat acid egg-plant. It is eaten either raw or cooked.

Upon the approach of winter we dig up some of the plants and remove them to the conservatory or forcing-house. It is in the capacity of ornamental plants that they will probably find their greatest usefulness in this latitude. The habit is attractive, the flowers bright and pleasant, and the fruit—if it is obtained—is highly ornamental and curious. The plant will stand a little frost.

The plant has not fruited freely with us, however, although it blooms profusely. We have endeavored to insure fruiting by hand pollination, but without success. The anthers give very little pollen. Perhaps half the plants succeed in setting two or three fruits apiece. All the fruits which we have raised have bern entirely seedless, and this appears to be the common experience. The seed-cavities remain, however, as shown in the cross-section in Fig. 7. The plant must be propagated by cuttings or layers, therefore. We obtained our stock from a botanical specimen which I obtained from Florida, and which was not thoroughly dried.

This plant was introduced into the United States from Guatemala in 1882 by Gustav Eisen, of California.* There has been much speculation as to its nativity and its true botanical position. At first it was thought by some to be a variety of the egg-plant,† but it is very distinct from that species. But the plant is by no means a novelty to science nor even to cultivation, for it was accurately described and figured so early as 1714 by Feuillée in his account of travels in Peru‡. He called it *Melongena laurifolia*. At that time the plant bore "several little lenticular seeds, one line broad." It was carefully cultivated in gardens, and the Indians ate it with delight. The taste is described as somewhat like a melon. Eating too heartily of it was supposed to bring on

* Orch. and Gard. x. 61 (1888).

† Gard. Monthly, xxix. 24, 48, 84, 120, 355 (1887).

‡ Journ. Obs. Phys. Math. et Bot. 735, t. 26.

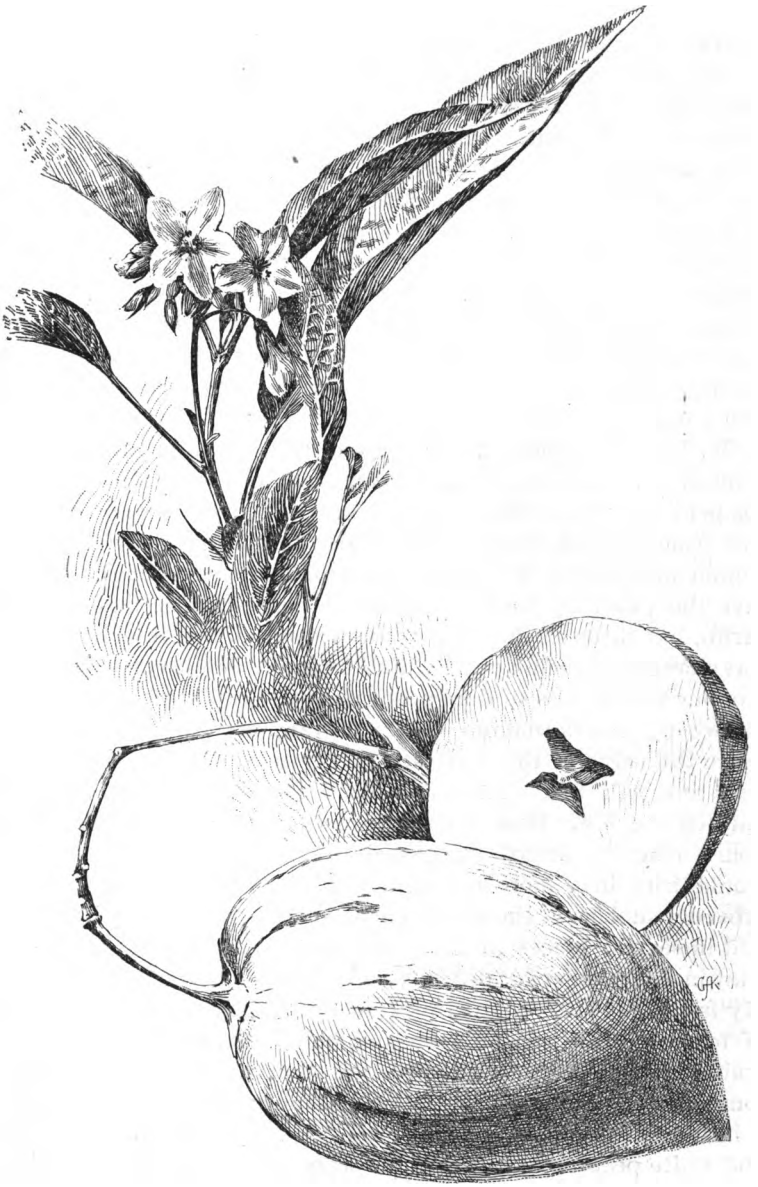

FIG. 7.—*Pepino* (*Solanum muricatum*, *Aiton*).

fevers. In Lima it is called Pepo. In 1799 it was again described and figured by botanists visiting Peru, Ruiz and Pavon.* They described the fruit as "ovate, pointed, smooth and shining, white variegated with purple, hanging, of the shape of a lemon." They say that it was much cultivated in Peru, and added that it was propagated by means of cuttings. It was called "Pepino de la tierra." In 1785, Thouin, a noted French gardener, introduced it into Europe, and four years later Aiton, of the Royal Garden at Kew, England, named it *Solanum muricatum.*† The specific name, *muricate* or *prickly*, was given in reference to the rough or warty character of the sprouts which spring from the root and which are often used for propagation. And now, over a hundred years later, it has found its way to us.

Mr. Eisen's account of the pepino will be interesting in this connection. "The Central American name of this plant," he writes "is pepino. Under this name it is known everywhere in the Central American highlands, and under this name only. But as pepino in Spanish also means cucumber, it was thought best to give the plant an English name. I suggested the name melon shrub, but through the error or the wisdom of a printer the name was changed to melon pear, which I confess is not very appropriate, but still no less so than pear guava, alligator pear, rose apple, strawberry guava, mango apple, custard apple, etc. * * * As to the value of the fruit and the success of it in the States, only time will tell. The fact that I found the plant growing only on the high land where the temperature in the shade seldom reaches 75° Fahr., suggested to me the probability that it would fruit in a more northern latitude. In California it has proved a success in the cooler parts, such as in Los Angeles city, and in several places in the coast range, and will undoubtedly fruit in many other localities, where it is not too hot. * * * My friend, the late Mr. J. Grelck, of Los Angeles, had a plantation of 10,000 pepinos, which grew and bore well and he sold considerable fruit. * * * In pulp and skin the pepino resembles somewhat the Bartlett pear, but in taste more a musk melon ; but it has besides a most delicious acid, entirely wanting in melons and quite peculiarly its own. In warm localities this acid does

* Flora Peruviana, ii. 32, t. 162 *a*.

† Hort. Kew. i. 250.

not develop, and this fact is the greatest drawback to the success of the fruit. The fruit has no seed, as a rule. And in all, I have found only a dozen seeds, and those in fruit which came from Salama in Guatemala, a place rather too warm to produce the finest quality of fruit. The botanical name of the pepino is not known to me with certainty. The same was described by the Franco-Guatemalan botanist, Mr. Rousignon, as *Solanum Melongena Guatemalense*, but it is to me quite evident that this solanum is not, nor is it closely related to the *S. Melongena* or egg-plant, which latter is a native of Central Asia. The pepino is probably a native of the Central American highlands, and appears to have been cultivated by the Indians before the conquest by the Spaniards."* Last year Mr. Eisen writes that "it has only succeeded in Florida, but has there proved of considerable value."†

The greatest fault of the pepino appears to be its failure to set fruit. Mr. Eisen states that in Guatemala it "yields abundantly, in fact enormously, 100 to 150 fruits to a vine four feet in diameter being nothing uncommon. I have seen it yield similarly in California, but whenever exposed to too much heat and dryness, it is very slow to set fruit."‡ He recommends that it be shaded if it refuses to set fruit. Martin Benson, Dade Co., Florida, writing to the *American Garden*,‖ says that he has had great success with it. "I counted the fruit on a medium sized plant and found it bore sixty, of all sizes, from those just set to some nearly matured and weighing upwards of a pound. The fruit varies considerably, but averages about the size of a goose egg. The fruit is the most perfectly seedless of any I have ever seen, without a trace of a seed. It requires cool weather in order to set fruit, and never does so excepting during a norther or other cool spell, when the fruit sets in great quantities." Mr. Benson's letter is accompanied by an admirable illustration of the fruit. In the northern states it has always proved a shy bearer, if I may judge from such records as exist. "D," writing to the *Gardener's Monthly*, says that he had "only about two pears to each plant,

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*Gard. Monthly, xxix. 84 (1887)

†Gard. and Forest, iii. 71 (1890).

‡Orch. and Gard. x. 61 (1888).

‖ix. 265 (1888).

among literally hundreds of blossoms."* *Orchard and Garden*† comments upon this feature as follows: "The general experience with it here [New Jersey], thus far, seems to justify us in calling it exceedingly shy in setting fruit, and if this tendency to abortive blooming cannot be overcome, the melon pear must be considered without practical value." These remarks are certainly counter to the statements and pictures made by some seedsmen in regard to its productiveness.

The pepino is an unusually interesting plant, and if it could be made to set fruit more freely in the north, it would be an acquisition for the kitchen garden and for market. It is a good ornamental plant. Altogether, it is deserving of a wider reputation.

CHOROGI.‡—*Stachys Sieboldi.*

Stachys Sieboldi, Miquel, Ann. Mus. Bot. Lugd-Bat. ii. 112 (1865-6).

Stachys affinis, Bunge, Mem. Savans. St. Petersb. ii. 51 (1834), not Fresenius.

Stachys tuberifera, Naudin, Bull. Soc. d'Acclim. France, 1887, 394.

In 1882 Dr. Bretschneider, physician to the Russian legation at Pekin, sent to the Society of Acclimatization of France tubers of a mint-like plant which is cultivated in China. The Society transferred the tubers to Mr. Paillieux, at Crosnes, near Paris, who grew them that season, and who has since been largely instrumental in introducing the plant to the horticultural world. Three or four years after its introduction the plant began to attract attention in France and England, and in 1887 Nandin named it *Stachys tuberifera*, upon the supposition that it is really not the true *Stachys affinis*, under which name it had passed. It appears to have been grown in England about as early as in France, probably from some of the stock which Paillieux had received or which he grew the first year.|| It was first exhibited in England Dec. 13, 1887, before the Royal Horticultural Society by Mr.

* Gard. Monthly, xxix. 355 (1887).

† x. 12 (1888). This article is accompanied by an illustration of the fruit, the first to appear, apparently, in this country.

‡ Pronounced Chor'ogi: ch soft, as in *chore;* both o's long; g hard; i short, as in *it.*

|| Gard. Chron. 3 ser. iv. 608; iii. 211. Garden, xxxiv. 464.

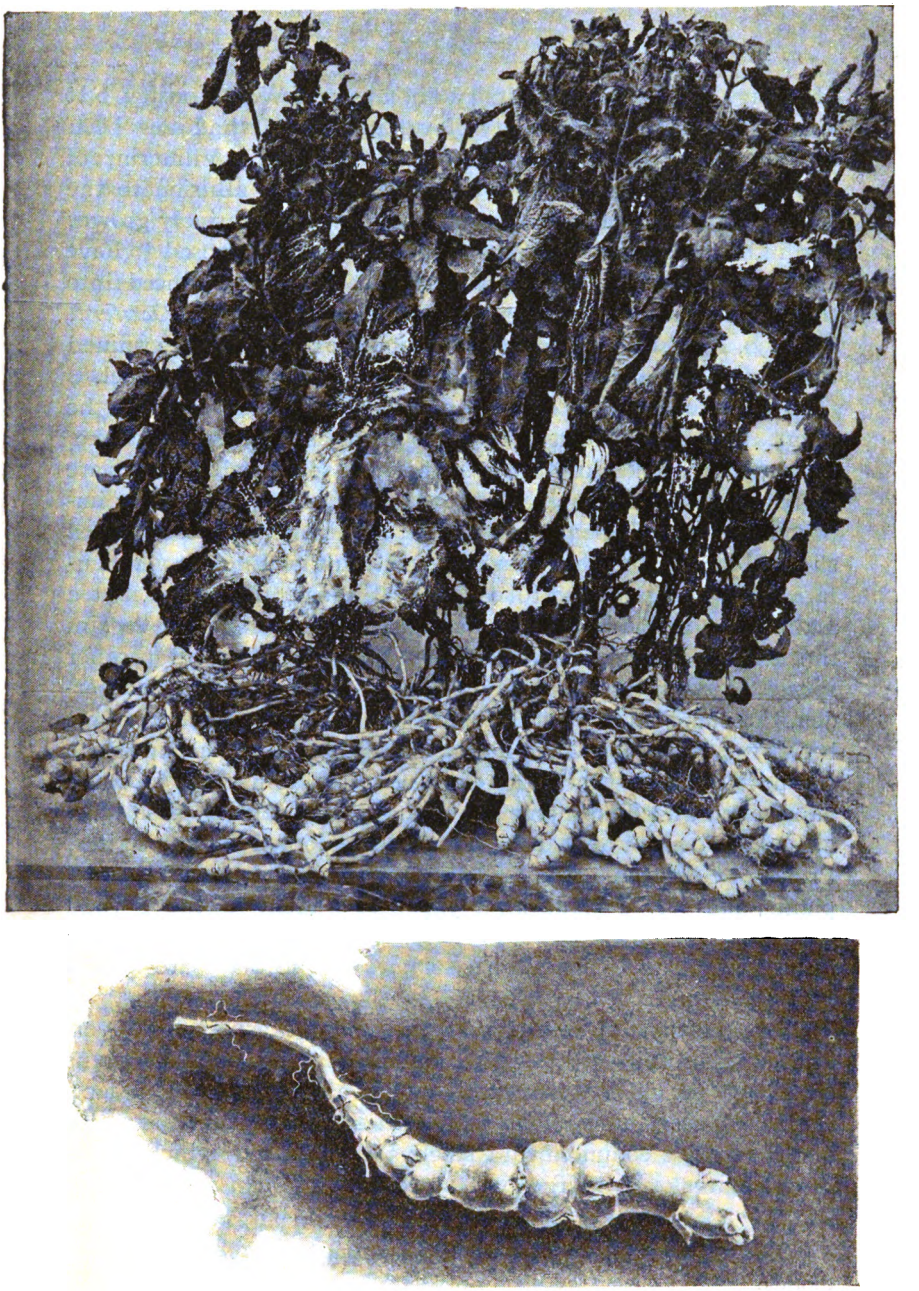

FIG. 8.—*Chorogi* (*Stachys Sieboldi*, *Miquel*). *Detached tuber natural size.*

Haskings, gardener to Sir Henry Thompson of West Mousley. It was certificated by the Society Nov. 14, 1888. It had now been introduced to the horticultural trade, chiefly by Vilmorin, of Paris, under the name of *Crosnes du Japon*, in allusion to the home of Mr. Paillieux where it had been most extensively grown, and in reference to the country whence it was supposed to have come originally. In the spring of 1888 it was introduced into this country under two names, *Stachys affinis* and *S. tuberifera*. In 1890, Hemsley, writing of the botany of China,* determined that the proper name of the plant is *Stachys Sieboldi* of Miquel.

It still remains to determine upon a good English name for the plant. Many names have been proposed, as Chinese artichoke, Japanese artichoke, knotroot, curlroot, and spirals, all of which are more or less objectionable if the plant is ever to assume any importance in trade. Some contend that the French *Crosnes du Japon* should be used, but this name does not suit an English vernacular. It is also proposed to call it by the scientific name, but a Latin name would hinder the popularizing of the plant. Again, the simple generic name stachys has been proposed, but as other species of stachys may come into cultivation in the kitchen garden, the name might lead to confusion. † It has seemed to me better to adopt some aboriginal name of the plant if a simple one can be found, and I have therefore ventured to use the Japanese name chorogi. This name has been suggested in English journals, but does not appear to have been adopted by any writer. Professor Georgeson, who is well known as a student of Japanese plants, and Mr. Takahashi, a Japanese student in the Cornell College of Agriculture, both inform me that this name is the one in use in Japan. The Chinese names for the plant are kan-lu and tsan-yungtzu.

Chorogi is a small perennial plant, with the aspect of peppermint or spearmint. It belongs to the mint family, and to a genus (Stachys) which is well represented in this country. In fact, there is some doubt among botanists as to whether it is really distinct from a common wild stachys (*S. palustris*) which grows in wet places over a large part of North America. Its value to

* Journ. Linn. Soc. xxvi. 301.

† We are now experimenting with an interesting tuberiferous species from Florida.

the gardener lies in the great number of crisp white tubers which it produces just under the ground. These tubers are thickened underground stems, like the potato tuber. Fig. 8 is an illustration of a plant as it appears in November, after being dug and having the earth washed from the roots. The detached tuber is natural size, and represents an average specimen as grown upon naturally poor but well enriched sandy soil. Although the tubers are small, they are so abundantly produced as to make the plant a heavy yielder. We imported tubers in the winter of 1889–90. They were in poor condition when planted, and the growth during 1890 was small. The plants were allowed to remain without protection during the winter, and this year they have spread so as to fill a row a foot and a half wide and have produced great numbers of tubers. We have eaten the tubers in several ways and I do not hesitate to pronounce the plant the most important acquisition to our list of secondary vegetables which has been made in several years. The tubers can be cooked in a great variety of ways, or they may be eaten raw. They are fried, roasted, baked, pickled, preserved, stewed in cream, and made into various fancy dishes. The tubers may be dug as wanted during the winter, and ordinarily enough of the plant will be left in the ground to propagate it the following year. The greatest fault with the vegetable is the fact that the tubers shrivel and spoil if exposed to the air for a few hours. This will interfere with their market qualities. They can be kept in earth, however, and the French market them in moist shavings, or in sawdust. Much of their value depends upon their crispness.

This plant has been much advertized, and as it bids fair to become a vegetable of some importance, I have collected here the experinces of various growers with it.

"The *Stachys tuberifera*, a so-called new vegetable from northern Africa [China], was tested, but cannot be pronounced a very great acquisition. It belongs to the mint family, and produces small fleshy tubers, which in our trial only attained the size of acorns. Its table qualities were not tested."—*Professor Goff, before Western N. Y. Hort. Soc. 1889, 28.* Our opinion was much the same as Professor Goff's at the close of our first season of test, but during the second year, the plants not having been dis-

turbed, the yield was wonderfully increased, and one plant yields a mess sufficent for a family of four.

"The tubers, which are the edible part, are produced in such an abundance as to be truly wonderful, as many as 300 having been grown from a single tuber in one season. * * * Their uses and best modes of preparation for the table are not yet known. We find by mashing them and preparing as we do egg-plant, that they closely resemble the latter, having that pleasant, spicy characteristic flavor; and as they are as easily kept as potatoes, it is a real treat to have this very good substitute in the winter. They are also good when fried or roasted."—*John F. Rupp, Pennsylvania, in Pop. Gard. iv. 122 (1889).*

"*Stachys tuberifera* is perfectly hardy in the north of France, and accommodates itself to various soils and conditions. The tubers are small, but each plant bears a great number of them, and it is very easy to harvest them. It is essentially a winter vegetable, the tubers forming late in summer and being dug in November. It is preserved anywhere under the soil, and is not injured by the frost of winter."—*Chas. Naudin, in Manuel de l'Acclimateur, 507 (1887).*

"A year ago the Dutch horticultural journal *Sempervirens* asked for reports upon *Stachys tuberifera* for European cultivation as an article of food. Twenty-one reports were submitted, among which seventeen were favorable, recommending the plant as a valuable addition to the list of table vegetables. Good sandy soil, not too dry, is said to be the best for it, as the tubers then become beautifully white, while in heavier soil they assume a brownish color."—*Gard. and Forest, ii. 144 (1889).*

"The new vegetable * * * seems to be winning its way in Germany. It was put to proof in the proverbial way at a recent meeting of the Society for the Promotion of Horticulture in Berlin, being eaten both boiled and roasted. Some who tested it pronounced roast potatoes much better, but the majority, says a German journal, declared that the stachys tubers have a 'fine, peculiar taste, and should be highly recommended to the epicure'."—*Gard. and Forest, ii. 600.*

"The new vegetable, *Stachys affinis*, has become quite popular in France, and is found now in all the principal fruit shops in Paris, the price varying from twelve to twenty-five cents a pound.

At Amiens, one of the principal centres of production, it has been sold for fifteen francs [about $3] a hundred pounds. Some one in that city conceived the happy idea of making a preserve of the tubers. Prepared in this way they lose nothing of their quality, and the question of keeping them is settled."—*Gard. and Forest, ii. 624.*

"I have now grown this new vegetable * * * for several years, and find it well worth extensive cultivation. It is much esteemed as a second course vegetable, and it is also a useful ingredient in the salad dish, looks well, and is very palatable as a pickle, and is a fitting companion to the breakfast radishes. * * * The yield is quite a bushel to about 16 square yards."—*P. Middleton, Gard. Chron. 3 ser. iii. 211 (1888).*

"Where stachys has once been planted, there is always a difficulty in ridding the land of them, and it is as troublesome as couch-grass."—*W. A. Cook, in Gard. Chron. 3 ser. viii. 667.*

The following account of forcing the plant is interesting: "Sets [tubers] were planted in 12-inch pots in December, the temperature maintained being 50° to 55°. I have also grown it in cold frames, with good result, having as many as 100 tubers on one plant."—*J. Claydon, in Gard. Chron. 3 ser. iii. 469.*

Several chemical analyses of this vegetable have been made, as follows:

Lhôte: *

Starch	17.80	per cent.
Albumen (including 0.69 N.)	4.31	"
Fatty matters	0.55	"
Woody matters and cellulose	1.34	"
Mineral matters (including 0.28 phosphoric acid	1.81	"
Water	74.19	"
	100.00	

Pailleux and Bois:

"The analysis given shows 78 per cent. of water, 1.50 of nitrogenous matters, 1.67 of amides, and 16.5 per cent. 'galactane'—a newly discovered carbohydrate—a substance allied to dextrine, and intermediate between starch and sugar. In the dry state the percentage of this substance is stated to be as high as 76.7, so that the nutritive value is high, particularly as the proteic matters are cited as 6.6 per cent."†

* Reported by Carrière, Revue Horticole, lvii. 237 (1885); also in Gard. Chron. 3 ser. iii. 16 (1888).

† Gard. Chron. 3 ser. vi. 164 (1889), abstr. from Revue des Sci. Nat. Appl.

Church:

"It appears that they contain 78 per cent. of water, 1.5 per cent. of albuminoids, 1.7 per cent. of non-albuminoids or amides, 16.6 per cent. of sugars, .7 per cent. of fibre, .1 per cent. of ash, .2 per cent. of fat, and a trace only of starch."*

Planta:†

	Fresh.		Dry.	
Water	78.33	per cent.		
Protein	1.50	"	6.68	per cent.
Amides	1.67	"	7.71	"
Fat (ether extract)	0.18	"	0.82	"
Nitrogen-free extract	16.57	"	76.71	"
Crude fiber	0.73	"	3.38	"
Ash	1.02	"	4.70	"
Dry substance	21.67	"	100.00	

At Cornell:

Water, 78.9 per cent.
Protein, 12.04 per cent.
Ash, 1.09 per cent.
The phosphoric acid, potash and lime are present in the ash as follows:
P_2O_5 .19 per cent.
K_2O .64 "
CaO .03 "

All these analyses show that chorogi rates fully as high as potatoes in food and fertilizer value.

From the foregoing experiences, it appears to be safe to recommend the chorogi for trial in every home garden.

* Before Royal Hort. Soc. Reported in Gard. Chron. 3 ser. iv. 708 (1888).
† Landwirtsch. Versuch-Stat. xxxv. 478 (1888).

NOTE.—Aside from the references given in this article, the student may find the following discussions of the species: Franchet and Savatier, Enum. Pl. Jap. i. 379. Maximowicz, Bull. Soc. Imper. Nat. Moscow, liv. 46 (1879). Pailleux and Bois, Bull. Soc. Nat. d'Acclimitation de France, 1884, 44 and 280; 1885, 196; 1889, 580 and 634 (illustr.). Revue Hort. 1885, 236; 1887, 266 (illustr.). Bull. Soc. Tosc. Ort. 1886, 68 (illustr.) Le Jardin, 1887, 8 (illustr.). Franchet, in Mem. Soc. Sci. Nat. Cherbourg, xxiv. 243. Dammer, in Humboldt, May, 1888. Dufour, in Chronique Agric. et Viticole du Canton de Vaud, Apr. 1888. Vöchting, in Botanische Zeitung, xlvii. 502, 1889 (illustr.). Gard. Mag. 1888, 779. Sahut, in Ann. Soc. Hort. et Nat. Hist. Hérault, xxii. 46 (1890).

SPANISH SALSIFY.—*Scolymus Hispanicus*, Linn.

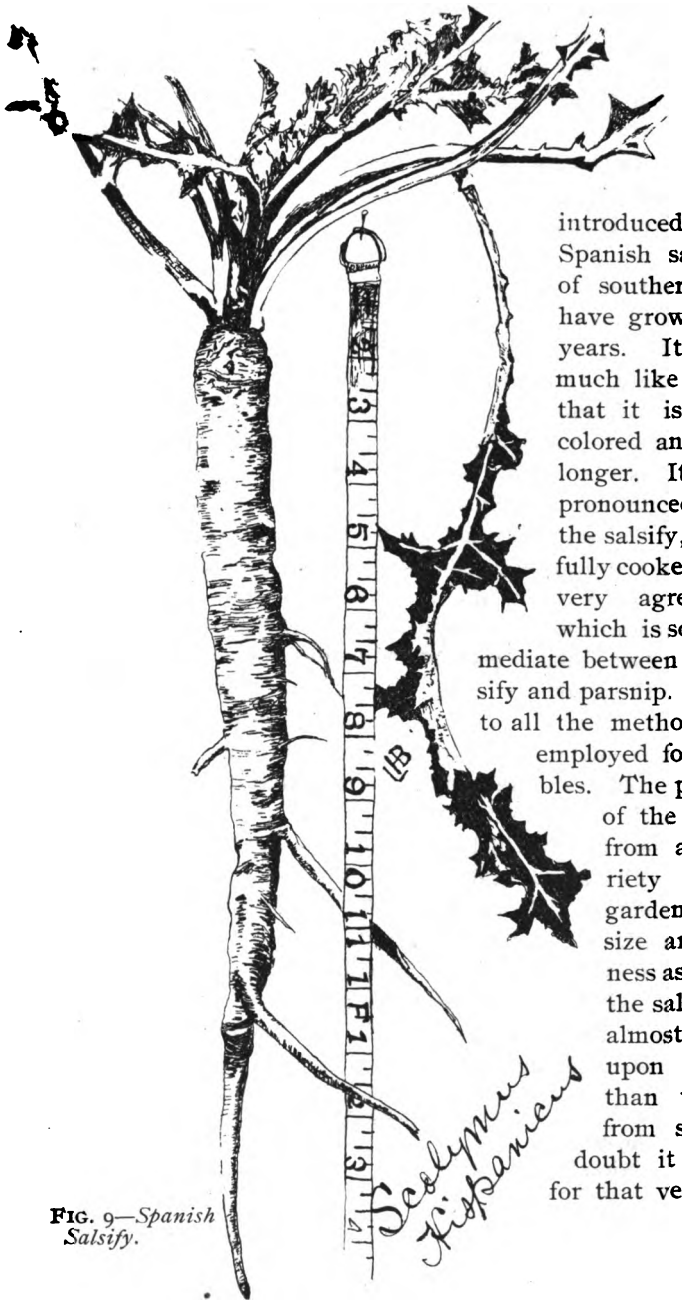

FIG. 9—*Spanish Salsify.*

A vegetable which promises to be of considerable value in this country, if once generally introduced, is the so-called Spanish salsify, a native of southern Europe. I have grown this for two years. It makes a root much like salsify, except that it is much lighter colored and considerably longer. Its flavor is less pronounced than that of the salsify, but when carefully cooked it possesses a very agreeable quality which is somewhat intermediate between that of the salsify and parsnip. It is adapted to all the methods of cooking employed for those vegetables. The particular value of the vegtable, aside from affording a variety in the kitchen garden, is its large size and productiveness as compared with the salsify. We raise almost twice the crop upon a given area than we can secure from salsify, and no doubt it could be sold for that vegetable in the

general market. The seeds are much easier to handle and sow than those of the salsify. It is sown and cultivated in exactly the same manner as that vegetable, and can be dug either in the fall or spring. Fig. 9 shows a good root. Perhaps the greatest disadvantage of the plant is the very prickly leaves, which may make it unpleasant to handle. But on the whole, it is worth introduction into American gardens. Seeds are offered by some American seedsmen.

Spanish salsify is closely allied to the cardoon and artichoke, and its young leaves are sometimes bleached and eaten like cardoons. Nicholson, in Dictionary of Gardening,* writes that "the roots of *Scolymus Hispanicus* are equally as good as scorzonera [the black salsify]; the leaves and stalks are eaten as cardoons by the people of Salamanca; the flowers are employed for the adulteration of saffron." Naudin, who is one of the highest authorities upon cultivated plants, makes these remarks about the species: † "It is a compositous biennial of the Mediterranean region, common in the middle of France and Spain, utilized as a vegetable, but cultivated only in Spain, especially about Madrid. The plant is spiny and has the appearance of a yellow-flowered thistle. In France only the root is eaten, and this resembles that of the salsify; in Spain the midribs and petioles of the leaves are eaten, and these are sold in great quantities upon the streets of cities during many months of the year. As with other plants, this is capable of amelioration by cultivation, and it is to be regretted that it is neglected in France and that people are content to gather it in the wild state. The root is a better vegetable than that of the salsify or the scorzonera." The plant was brought to the attention of American gardeners nearly thirty years ago by Burr.‡ He gave directions for its cultivation, and wrote as follows of the quality: "They have a pleasant delicate flavor and are considered to be not only healthful, but remarkably nutritious." An account of it is given in the American Horticultural Annual for 1871, and the following remarks are made: "It does not seem to be quite as hardy as the salsify, some of our plants which were left out for experiment being found partly decayed in the spring.

* Vol. iii. 394. See also Vilmorin's Veg. Garden (Eng. ed.) 249.

† Manuel de l' Acclimateur, 491 (1887).

‡ Vegetables of America, 87.

The root is considerably larger than the salsify, and less trouble to prepare, does not require so much care in cooking to prevent it from turning dark-colored, and has a milder flavor, which is by some preferred to that of the salsify. On the other hand the plant, being prickly, is somewhat unpleasant to handle, the roots being longer and more brittle are more difficult to dig, and the center is somewhat fibrous. The last named difficulty is overcome by the French by first boiling the roots, then splitting them longitudinally and removing the tough center, which readily separates from the outer portion, which is very tender." We have not found tough centers in our plants.

THE INFLUENCE OF THE DEPTH OF TRANSPLANTING UPON THE HEADING OF CABBAGES.

For three consecutive seasons we have endeavored to determine what foundation there may be for the common notion that deep-set cabbage plants give better heads and a larger proportion of heads than those set at the normal or natural depth. It is a very general practice among gardeners to set the plants to the depth of the first leaf when transplanting to the field. The results of three years' tests show that no advantage is to be gained by such practice. In 1889* the experiment was tried upon 12 varieties, about 20 plants of each being set up to the first leaf, and as many more set to the same depth at which they stood in the seed-bed. Strangely enough, one-half the varieties gave better results from shallow setting and the other half better from deep setting. There were more heavy heads from the deep setting, however: 270 cabbages gave better results from shallow planting and 295 heads better from deep planting. The total average gain in weight apparently due to deep setting was 2 oz. per head. These 12 varieties were distributed into 13 lots—that is, one variety was grown twice,—and of these, three lots were sown July 2nd. for a late crop. Two of these three late sowings gave better results from deep setting, but the third lot, which gave better results from shallow setting, gave a greater increase in weight than either of the others. Combining all the results, it was found that the gain in weight of heads from deep setting was as 13.60 is to

*Bull. xv. 209.

13.46. This is a very small gain, and when studied in connection with the many conflicting results among the different lots, leads to the conclusion that the particular method of planting probably had nothing to do with the yields, for variations equally as great, and many times much greater, come from lots treated in the same manner.

In 1890* the test was repeated, the Early Wakefield cabbage being used for the purpose. The plants were grown upon a heavy and rather poor clay loam. The numercial results were as follows:

	Total no. of plants.	No. of mature or solid heads.	Per. cent of plts. producing mature hds.	Average weight per. hd.
Deep	107	82	**77**	**1.6** lbs
Shallow	104	89	**85**	**1.8** lbs

Here the shallow planting gave decidedly the better results, both in the percentage of plants producing good heads and in the average weight of heads.

In 1891 the test was again repeated, this time with Early Wakefield and Premium Drumhead. The plants were grown on a rich and well prepared loose clay loam, and all the conditions throughout the season were such as to insure a fair and uniform test. The results of this test are the following:

	Total no. plants.	No. of mature heads.	Per cent. of plants producing mature hds.	Average. weight per head.
Early Wakefield—*Deep*	71	70	**98.6**	**4.26** lbs.
Shallow	61	55	**90.6**	**4.24** "
Premium Drumhead—*Deep*	30	29	**96.6**	**5.19** "
Shallow	45	45	**100.**	**5.37** "
Average—*Deep*			**97.6**	**4.72**
Shallow			**95.3**	**4.80**

The average result is in favor of the shallow setting so far as weight of heads is concerned, but in favor of deep setting in the percentage of plants producing good or mature heads; but the differences are slight, and are such as might be expected from two or more lots of plants treated in the same manner. The two varieties give different results, however. The Early Wakefield gives the better results from deep setting, while the Drumhead gives better results from shallow setting. In view of these con-

*Bull. xxv. 178.

flicting results, I cannot look upon the differences as due to the manner of setting.

In conclusion, we find, as a result of three years' investigation, that the depth at which strong and stocky cabbage plants are set does not influence the extent or weight of the crop.

THE VERBENA MILDEW.

The verbena mildew (*Oidium erysiphioides*), which is often very destructive to house-grown plants, has been held in check in our houses by the use of sulphide of potassium (¼ oz. to a gallon of water). A lot of thrifty and stocky young plants which were badly attacked was divided into two lots for treatment, the lots being placed in separate houses. The treated plants received a spray of the sulphide about twice a week, and although a little of the mildew could always be found, the plants were not injured. The check lot was ruined, and the plants died. It is probable that copper compounds, as the ammoniacal carbonate of copper, will be found still more effective, but our simple treatment was so successful that we found no occasion to try any other. This mildew appears upon the leaves and young shoots in white mold-like patches.

L. H. BAILEY.